Salinity transport through the Florida Straits

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A new dataset is used to define and calculate salinity transport through the Florida Straits using the submarine cable that has previously been calibrated for volume and temperature transport. Thirty two transects were collected since 2001 with conductivity/temperature/depth sensors (CTDs) and lowered acoustic Doppler current profilers (LADCPs). A salinity calibration is obtained by regressing salinity transport against volume transport, where salinity transport is calculated relative to the basin-averaged salinity at 26°N ($S_{\mathrm{ref}} = 35.156$ psu). On average, the transect-derived salinity transport is 33.0 Sv psu, has a standard deviation of 2.8 Sv psu, and has a 90-th percentile range of 29.1–37.4 Sv psu. The cable-derived salinity transport has a root-mean-square error of 2.2 Sv psu compared to the CTD/LADCP transects. Inherent spatial fluctuations and their co-variability in the Florida Straits are responsible for noise in the calibrations and for slight increases in accuracy from salinity to temperature to volume calibrations. Salinity fluctuations are strongest in mid-depth waters of intermediate salinity, where velocity is neither particularly fast nor variable. In contrast, temperature is highly stratified and warm near-surface waters coincide with fast and variable velocities. Temperature and salinity transports are largely driven by volume transport, which in turn, because of a large average electrical conductivity, is closely related to the conductivity-weighted velocity that generates the cable-measured voltage.